speaker output modified by his or her own preferred radio adjustment settings previously stored in the radio memory.

For a multi-driver vehicle, an identification system in the vehicle first uniquely identifies the driver entering the vehicle. The identification process may be accomplished by a number of ways including a His/Her switch located inside the vehicle, a remote-controlled transmission, or even a key insertion. After the driver is identified, his radio adjustment setting preferences previously stored in the radio memory will be accessed and applied to the speaker output once the radio is turned on. Each driver in this multi-driver vehicle is likely to have a set of adjustment setting preferences stored in the radio memory different from that of another, but each set is made available to be used by the radio once the 'owner' of that set is identified to have entered the vehicle.

A preferred embodiment of the present invention includes a radio apparatus that stores the preferred adjustment settings for all of the multiple users of the radio apparatus. The in-use adjustment settings are stored into the radio memory when a driver turns off the radio. Subsequently, by identifying the same driver, the radio apparatus will make available the previously stored radio adjustment settings the next time the driver enters the car and turns on the radio apparatus.

Advantageously, the present invention reduces confusion and adds comfort to the drivers of the same vehicle in that when a driver returns to a multi-driver vehicle and turns on the radio, the radio adjustment settings that he had on when he last used the car radio will be applied to the speaker output. It is as if this driver is the only driver of the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention can be obtained by considering the following detailed description taken together with the accompanying drawings that illustrate preferred embodiments of the present invention in which:

FIG. 1 shows a typical appearance of a car radio; and

FIG. 2 shows a simplified functional diagram of the present invention including a vehicle micro-controller in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With today's advances in technology, the design of specialized integrated circuits and programmable logic generally do not require the rendering of fully detailed circuit diagrams. The definition of logic functionality allows computer design techniques to design the desired logic and circuits. Additionally, vehicle micro-controllers are known to operate based on a desired flow chart diagram rendered into software. Accordingly, portions of the present invention will be described primarily in terms of functionality to be implemented by a vehicle micro-controller and other associated electronic components. This functionality will be described in detail with the associated flow chart diagram. Those of ordinary skill in the art, once given the following descriptions of the various functions to be carried out by the present invention will be able to implement the necessary micro-controller structure and logic for various logic devices or

custom designed integrated circuits in suitable technologies without undue experimentation.

Now referring to FIG. 1, it shows a typical appearance of a car radio 11. An ON/OFF and a sound volume selection features are usually accomplished by the use of a knob 14. Sometimes additional features such as left/right speaker volume and bass/treble range adjustments may be activated by first pulling outward or pushing inward the knob 14. A desired radio station tuning frequency may be selected by the use of another knob 22. Typically, on a face 13 of the car radio 11, there are several mechanical push buttons 17. Each of these mechanical push buttons 17 is used to store and to select the tuning frequency of a preferred radio station. In short, after storing the frequency of a preferred radio station using one of the mechanical push buttons 17, a driver may subsequently cause the radio to tune to that previously stored radio station frequency by depressing that particular mechanical push button 17. The mechanism and method for such storage and selection are well known, and the details of which will not be elaborated here. A preferred embodiment of the present invention may take on the outside appearance of this typical car radio 11. Functionally speaking, however, each of the mechanical push buttons 17 of the present invention may be used to store and to select instead of one, but more than one station tuning frequency depending on the identity of the user.

Referring now to FIG. 2, it shows a simplified functional diagram of a radio system 100 including a vehicle micro-controller 110 in accordance with the present invention. The radio system 100 includes an identification system 105,

the vehicle micro-controller 110 and a radio 115. The micro-controller 110 is coupled with the identification system 105 via path 102 and couples to the radio 115 via path 103. User input is received by the identification system 105 via path 101, and user input is also received by the radio 115 via paths 106 and 113. The micro-controller 110 may or may not be a part of the radio 115, and if it 115 is not, it 115 usually has functions in addition to radio 115 control, for example temperature monitoring and control (not shown).

The identification system 105 is commonplace in today's vehicles. It 105 may be a His/Her toggle switch and related circuitry found in many cars where a toggle (user input via path 101) in "His" direction identifies one driver and a toggle in "Her" direction identifies another driver. Such identification may be used for temperature control in different portions of the vehicle internal compartment. Even with keys, differing notch-and-groove key patterns may be used to lock and unlock the same lock but each key pattern when inserted may be sensed to enable the present invention to distinguish one user from another. In the newer car models, biometrics such as voice or even fingerprint may be used for driver identification.

Also, in a car where a remote device (e.g., a keyless entry system) is used for locking and unlocking vehicle doors, uniquely-coded transmissions may be generated by this typical device to distinguish one driver from another. The car may have several such remote devices one for each driver of the car, and each device generates a unique transmission for door locking/unlocking and identification purposes. Alternatively, a remote device may have more than one

button where each button controls the generation of one unique transmission to the car locking/unlocking and identification system. In other words, one driver may use button X on a remote device and another driver may use button Y on another remote device for locking/unlocking and identification purposes.

The information of the driver identity is then transmitted from the identification system 105 to the micro-controller 110 via path 102 whereby making the information available for use by the radio 115 via path 103. The radio 115 includes control electronics 120, preference storage and selection means 126, adjustment setting means 132 and memory 112. The driver identification information will be used by the radio 115 depending on the ON/OFF input via path 106 to the control electronics 120 of the radio 115. For example, if a user turns the knob 14 of FIG. 1 OFF, then the radio 115 would not process the driver identification information although such information is available in the identification system 105.

The preference storage and selection means 126 in a preferred embodiment includes half a dozen or so mechanical push buttons disposed on a face of the radio 115 similar to the prior art buttons 17 in FIG. 1. The radio station preference information as user input is stored into the memory 112 via paths 111, 109 for subsequent selection under the control of the control electronics 120 via paths 111, 107.

The adjustment setting means 132 in a preferred embodiment includes the typical knobs (e.g., reference 14 of Fig. 1), dials or other user input devices 130 where preferred radio adjustment settings for volume (of each speaker or all

speakers), bass, treble and the like for a user are entered and stored in the radio memory 112. Such stored adjustment setting information is associated with the driver identification information of the user in the memory 112 so that the settings that were last used before the turn off of the radio will be applied by the control electronics 120 to the speaker output once the same user is identified the next time he turns on the radio 115.

When the radio 115 is ON, a driver may provide user input via path 113 to either store or select preferred radio station frequencies using methods well known in the art. Since the current driver identity is received by the radio 115 from the identification system 105, the preference storage and selection information actuated by using the preference means 126 via path 113 is then associated with the current driver identity in the memory 112. For instance, a driver A saves a radio station frequency B through the preference means 126 (e.g., depressing a mechanical push button C for a few seconds while the station is being tuned to). The control electronics 120 will then process the information and will then preferably via firmware and in memory 112 link the radio station frequency B to the mechanical button C and the current driver identity received from the identification system 105. Subsequently, to select and tune to the previously-saved radio station B, the driver A after having been identified by the identification system 105, will actuate the preference means 126 (e.g., depressing briefly the mechanical push button C). The control electronics 120 will then retrieve from memory 112 the radio station frequency B that is linked to the

matching current driver identity and the mechanical push button C and will then proceed to tune to the radio station frequency B.

As a result, the driver A storing or selecting a radio station frequency using a particular mechanical button of the preference means 126 is distinguishable from a driver D storing or selecting another radio station frequency using the same particular mechanical button. In other words, the driver A operates the preference means 126 as if he is the only driver to the car and the same is true for driver D.

The foregoing description of preferred embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. It is intended that the scope of the invention be defined by the claims appended hereto and their equivalents.